



“FORMULATION AND EVALUATION OF FLAX SOAP”

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ABSTRACT :

Plants with medicinal properties are being used as traditional medicine from times immemorial. The extract obtained from the leaves, stem and roots of various medicinal plants have been employed as a natural remedy in curing various ailments and diseases. The aim of the present study is to formulate herbal soap containing flaxseed, tomato juice and further subjected to physicochemical characterizations such as color, odor, texture, foam height, foam retention, irritation, saponification value and pH. The main ingredient, flaxseed commonly known as green gram, has therapeutic qualities. Moong dal, is excellent for oily and acne-prone skin for beautification purpose. Green gram eliminates dangerous bacteria, removes dirt and excess oil, leaving the skin clear, supple and free of wrinkles. The antibacterial activity of the formulated soap was checked in agar diffusion method and it shows moderate active against the *S. aureus* and *E.coli*. The results show that the soap possesses moderate antimicrobial activity. The objective of this study is to formulate poly herbal soap for the beautification purpose. Hence, this study is concluded as the formulated poly herbal soap can be used as for the cleansing and beautification purpose.

INTRODUCTION

Soap is an important personal hygiene product that is used for cleaning the skin. Polyherbal soaps are soaps that contain more than one herbal ingredient. Polyherbal soaps are becoming popular because they offer several benefits to the skin due to the presence of multiple herbal ingredients. In this review, we will discuss the formulation and evaluation of polyherbal soaps.

The word **Soap** (Latin Sapo) which is cognate with Latin sebum tallow originally was applied to the product obtained by treating tallow with ashes. "Soap considered commercially, a body which on treatment with water liberates alkali."

3.1. TYPES OF SOAP

1. Natural/Herbal Soap
2. Liquid Soap
3. Moisturizing Soap
4. Anti-bacterial Soap
5. Chemical Free Soap
6. Foam Soap
7. Bar Soap
8. Body Soap

Skin is the largest sensory organ in the body. It serves as a barrier that protects the body organs and gathers sensory data from the surroundings. Additionally, it aids in keeping the body's temperature at a healthy level. Diverse distinctive cells and structures can be found in the skin. The hypodermis, dermis, and epidermis are the three primary layers. Each layer contributes in a unique way to how the skin works as a whole. As skin imparts a specialized function to body wellbeing, it is necessary for us to keep it away for skin diseases and alignments. Skin conditions are a prevalent illness. It harms people of all ages, including newborns and the elderly, and does so in several different ways. Infections, allergies, sun exposure, injuries, and other factors can all lead to skin issues.

Ever since the earliest times, people have employed medicinal plants as a form of treatment. Various medicinal plants' leaves, stems, and roots have been used as a natural cure to treat a diversity of maladies and afflictions. Even if many plant-based treatments have been replaced by synthetic alternatives, ayurvedic products nevertheless stand out for their effectiveness and safety.

The anti-oxidant, anti-bacterial, cytotoxic, anti-microbial, hypotensive, anti-diuretic, antiinflammatory, anti-spasmodic, anti-diabetic, anti-hemorrhagic, and anti-helminthic qualities of numerous herbs are discovered with high nutritional value. Owing to their high medical value, cost-effectiveness, availability, and compatibility, incorporation of natural products to a preparation helps in treating practically all diseases and skin issues. The active compounds which provide these plants their therapeutic benefits are isolated and used topically in creams, soaps, oils, and ointments to treat skin conditions like acne, eczemas, wounds, and ringworms as well as for cosmetic and anti-microbial purposes. The therapeutic benefits of plants are used in a variety of formulations for both medical and cosmetic purposes .

A report published by WHO stated that a whopping 34% of all occupational disorders are skin diseases and data of 2020 revealed that skin diseases death in India reached 17,857 i.e. 0.21% of total deaths. So, in order to counteract the situation, the best option is to incorporate herbal potentials in the formulation, which provide fewer effects and impart good treatment options with lesser side effects and higher safety. So, the present work focuses on the preparation of medicated herbal soap incorporating different herbs active potentials, making it antioxidant and antibacterial active soap, which can be used as a regular bathing soap.

3.2. METHODES OF SOAP MAKING

In general there are five methods of making soap , such as **cold process, melt and pour ,hot process and rebatch . liquid soap.**

a. **Cold Process Soap :**

This is the most common type of soap making, though it is slightly more difficult than the melt-and-pour method. One of the advantages to cold process soap making is that it offers you the option to use Essential Oils in your soap, or add in other herbs, fragrances, and colors as you prefer. Additionally, cold process soaps are of higher quality and last longer than other soaps. However, there are also some disadvantages, as this method involves using dangerous chemicals, meaning you need to use proper safety equipment and precautions. The soap also takes a long time to prepare and cure, meaning the process can take up to six weeks from start to finish.

b. **Hot Process Soap :**

Similar to cold process soap in terms of ingredients, hot process Soap Making differs because it is cooked instead of cured! This means you won't have to wait the long curing time you do for cold process soap, but you are adding the element of heat, which is an additional safety concern.

c. **Melt Process Soap :**

The melt-and-pour method is the perfect place to start. It involves buying a soap base and then experimenting with add-ins such as essential oils, colorings, and fancy molds. This method of soap making is great for doing with older children (under adult supervision, of course), and doesn't cost a lot in terms of materials or time. The disadvantages of melt-and-pour soap are that it tends to be of lower quality, and there aren't always a lot of options when it comes to choosing which soap base you wish to use.

d. **Rebatch Process Soap :**

In some ways, the rebatched soap method is similar to the melt-and-pour method. It involves taking existing bars of soap and melting them down, thus creating your own, new blend. You can use milk, tea (infused with herbs), or water to melt the soap, which will contribute to your new creation. This is obviously an easier and safer route to go in comparison to the hot and cold process methods of soap making, but it does limit the amount of creativity you get to use.

e. **Liquid Soap :**

These days, a lot of people prefer liquid soap to bar soap, due to ease of use. Liquid soaps are easy to make, and they have the added benefit of being great gifts! This method involves taking a bar of soap and melting it down with water and glycerine until it dissolves into a liquid base. You can then customize it with essential oils and coloring agents.

3.3. HERBS USED IN FORMULATION :

3.3.1. Flaxseed:



- Biological source : *Linum usitatissimu*
- Family : Linaceae • Geographical sources : Argentina, India, Russia, and Canada.
- Chemical Composition : Flaxseed is well-known for the content of chemical compounds with specific biological activity and functional properties: Polyunsaturated fatty acids (PUFA) omega3 family, soluble dietary fibers, lignans, proteins and carbohydrates.
- Uses : nutritional supplement, anti-aging property, also used for purpose of printing notes and cigarette paper .

3.3.2. Tomato :



- Biological source : *Solanum pimpinellifolium*
- Family : Solanaceae
- Chemical Composition : minerals, vitamins, proteins, essential amino acids monounsaturated fatty acids (linoleic and linolenic acids), carotenoids (lycopene and β -carotenoids) and phytosterols (β -sitosterol, campesterol and stigmasterol).
- Uses :for skin – reduce oil , reduce acne , brightening the skin, relieves skin irritation.

3.3.3. Almond oil:



- Biological source : *Prunus amygdalus*
- Family : Rosaceae
- Chemical Composition : Oleic acid , stearic acid , linoleic acid , palmitoleic acid
- Uses : Reduce the appearance of scars, stretch marks, and wrinkles and to treat skin conditions.
- **Formulation Ingredients and its uses**

Sr.no	Ingredients	Uses
1	Flaxseeds	Anti-ageing, antimicrobial, highly nutritional value,
2	Tomato juice	Cleaning , astringent
3	Almond oil	Nourishing
5	Perfume / Essential oils	Fragrance

Table 1: Ingredients and Uses

AIM :

Formulation And Evaluation Of Flax Soap

OBJECTIVES :

- To understand how to make soap.
- To treat skin ailments like cleaning, dead skin, moisturizing, acne wounds.
- For cosmetics purpose .
- To introduce the flax as a soap purpose.
- To promote utilization of almond oil and herbal extract as raw material for soap making.

4.LITERATURE SURVEY:**1) Dr. K. Blessi Priyanka et.al. 2023 :**

Plants with medicinal properties are being used as traditional medicine from times have been employed as a natural remedy in curing various ailments and diseases. The aim of this study is to formulate herbal soap containing Vigna radiate, aloe vera, tomato juice, and further subjected to physicochemical characterization such as color, odor, texture, foaming ability, foam retention time, pH, saponification value. The objective of the study isto formulate polyherbal soap for the beautification purpose. Hence, this study is concluded as the formulated polyherbal soap can be used as for the cleansing and beautification purpose.

2) Dr. Utane et.al. 2017 :

Presently the entire world is endeavoring to return towards the natural herbal materials through it has a no some other side effects towards ailments. We are utilizing manufactured items for our hair, losing their magnificence, quality, strength, volume and shine. Every single manufactured item like cleanser contains a destructive substance which is in charge of damage of hair. HS is the only product which used for hair washing and also used for hair remedy on hair problem. In recent study herbal HS (HS) has remarkable properties toward hairs. Greener preparation of HS made has two sections, In first section contain, herbal extract prepared by mixture of amla, reetha, shikakai, nagarmotha, bhringaraj, brahmi, aloe vera, lemon juice and some ingredients. Herb extract (10%) take an amla, reetha, shikakai, nagarmotha, bhringaraj, brahmi all in dried form in a beaker in aqueous medium, warm up to till the beginning of boil by microwave method, sieve and put for cooling, obtained herb extract. For their transparency add some lemon squeeze in it, followed by mixing up to colourless. In second section beaker contains SLES, glycerin and CAPB everyone followed by stirring gradually, Herb extract with lemon juice in it stir gradually due to avoid foaming. Preservative methyl paraben and sodium benzoate, for pearl sing impact with EGMS to it. Pour an Aloe vera in it, with small concentration of cocamo it, mockup with water in it for small proportion, increasing a thickness with cocodi, obtained product HS. The formed HS is thick semi white transparent in colour, with great foam producing ability and fluidity. The pH of HS is between 6-7 at 25°C RT, formed HS is acidic in nature which is good quality. Percentage of solid contents of HS is 0.05g after dry. The cleansing action of the formed HS is 15.1. Dirt dispersion of formed HS is light. In 1% of HS it gives 46ml froth. All these are these characters demonstrates that the herbal HS is high quality for usable in daily life.

3) Ashlesha Ghanwat et.al. 2022 :

A herbal soap and hand sanitizer was formulated using the leaf and bark extract of *Azadirachta indica*, *Ocimum tenuiflorum*, *Sapindus mukorossi* and *Acacia concinna* powder. Ayurvedic cosmetics are also known as the herbal cosmetics the natural content in the herbs does not have any side effect on the human body most herbal supplement are based on several botanical ingredients with long histories of traditional or folk medicine usage. Among the numerous botanical ingredients available in the market today. Numerous chemical toxins microorganism present in the atmosphere may cause chemical infection and damage to skin cosmetics alone are not sufficient to take care of skin and body parts. Neem (*Azadirachta indica*) tree has attracted worldwide prominence owing to its wide range of medicinal properties, neem leaves and its constituents have been demonstrated to exhibit anti-inflammatory, antihyperglycemic, antiulcer antimalarial, antifungal, antibacterial, antimutagenic and anticarcinogenic properties. This study was conducted to evaluate the effect of aqueous, ethanolic and ethyl acetate extract from neem leaves. Herbal soap ingredients were used reetha, neem, shikakai and tulsi, in which neem leaf and seed were found effective against some dermatophytes. Shikakai and Reetha acts as a detergent and having cleaning and foaming activity and Tulsi shows antiviral activity.

4) Rajju Priya Soni et.al 2017 :

Flaxseed is cultivated in many parts of world for fiber, oil as well as for medicinal purposes and also as nutritional product. It is a native of Egypt but also cultivated in India, Holland, Russia and Britannia mainly for the purpose of its oil and fiber and is best adapted to fertile, fine textured, clay soils. Flax was valued in Ancient and Early Modern times as both a food and medicine. In this review, nutrients, anti-nutrients, functional properties and health benefits of bioactive molecules viz., essential fatty acids, lignans and dietary fiber of flaxseed are discussed. Flaxseed contains good amount of α -Linolenic Acid (ALA), omega-3 fatty acid, protein, dietary fiber, lignan specifically Secoisolariciresinol diglucoside (SDG). ALA is beneficial for infant brain development, reducing blood lipids and cardiovascular diseases. Researchers reported that

flaxseed incorporated food products can have good consumer acceptability along with its nutritional benefits.

5) Minakshi Ghosh :

The present study evaluate the screening of phyto chemicals and oxidative stability of Flax seed (*Linum usitatissimum L.*) Oil after extraction by polar (iso propanol) and non polar (hexane) solvent yielding 35% and 40% flax seed oil respectively. Phyto chemical screening of defatted flax seed meal extracted by polar and non polar solvent was also conducted. Phyto chemicals indicated the occurrence of Alkaloids, Glycosides, Saponin, Flavonoids, Phenolic compounds in the oil and defatted flax seed meal which also contained carbohydrate and protein.

6) Bernacchia R 2014 :

Flaxseed or linseed (*Linum usitatissimum L.*) comes from the flax plant, an annual herb. The main importance of flaxseed is in the human nutrition sector because it is emerging as an important functional food ingredient thanks to the content of active compounds, pointed to provide health benefits. There are several ways to eat flaxseed: milled, in the form of oil or added to bakery product. Scientific evidences support consumption of flaxseed for the high content in omega-3, omega-6 rich oil, α -linolenic acid, lignans, high quality proteins and fibers, compounds which are biologically active in the prevention of some chronic diseases such as many types of cancer, diabetes, cardiovascular diseases and cerebrovascular stroke. Furthermore, advantages in flaxseed consumptions are shown in animal nutrition sector and therefore result in healthier food from animal origin. In fact, the fatty acid profile of the meat and fat is directly affected by the source of fat in diet in swine and poultry, feeding omega-3 enriched diets by the addition of flaxseed would increase the omega-3 content in eggs and meat and thus enrich the products. The present review is focused on recent data on flaxseed chemical composition and its beneficial effects.

7) Safal Sharma 2014 :

Objective: The final goal of this research is to develop and evaluate herbal bath soap taking various bioactive herbal plants extract with different ethnic and dermatological importance in ayurveda, namely *Solanum lycopersicum*, *Sapindus mukorossi*, *Acacia nilotica*, *Citrus limon*, *Aloe barbadensis*, *Piper betle*, *Curcuma longa* and *Cocos nucifera*. Methods: The extract of all plant materials were obtained through various extraction procedures suitable for them. The extract was then mixed with lye and fatty oil for preparing a soap using the cold saponification method. Results: The prepared soap was evaluated against marketed soap. The prepared soap was found to be good in appearance, color and odor. pH, % free alkali content, foamability, foam stability, moisture content and alcohol insoluble matter were found to be 9.6, 0.22, 15 cm, 14.5 cm, 3.26 and 17.25, respectively. The antioxidant activity and antibacterial studies were done, which signifies prepared soap to be a potent antioxidant and antibacterial source. Conclusion: Based on the study results it can be concluded that herbal soap can be formulated using cold process method, taking different parameters in consideration as that of skin condition and as that of herbal potentials and its activity. This sought of herbal formulation can bring a big difference in the field of herbal cosmetic as there are many alignment and related flaws in different polyherbal or chemical-based formulations which can be removed.

8) L. V. Vigneswaran 2021 :

Background: The need to achieve and maintain healthy skin is on the rise. This causes the composition of antioxidant soaps with complex synthetic chemicals whose safety on skin and human health is still unclear. Objectives: The present work involves the formulation and evaluation of poly herbal soaps. Methods: The herbal soaps were formulated using *Azadirachta indica*, *Prunus communis Linn*, *Aloe barbedensis*, *Curcuma longa* and evaluated for various properties like colour, odour, pH, foam retention (Fr), foam height (Fh). Results: Polyherbal soap F5 gave the most stable foam with over 3 minutes and 45 seconds foam retention when small amount of soap was dissolved in distilled water. The results of the formulated soaps, reveal that formula containing only one show less significant activity than formula with two or more combined.

Conclusion: The results of the study offer potential alternative to the cosmetic industry in polyherbal soap production. **9) Shivram R. 2023 :**

Poly-herbal skin glowing soap was prepared by using herbs like *Manilkara zapota* (sapodilla), *Cinnamomum zeylanicum* (cinnamon), *Azadirchta indica* extract. Herbal cosmetics are also known as traditional cosmetics as the natural content in the herbs does not have any side effect on the human body. Sapodilla has wide range of medicinal properties and its constituents have moisturizing, skin glowing, anti-aging properties and antioxidant activity. It is a good source of carotenoids, multi vitamins, essential mineral and lot of fibers. It is also one of the rich sources of sugars, proteins, ascorbic acid and minerals like iron, copper, zinc, calcium and potassium. Carotenoids have antioxidant activity, so it produces skin glowing effect and reduce the wrinkles. Cinnamon has antifungal, antioxidant, antibacterial properties and it dries out the skin by supporting enhanced blood flow. Neem is able to balance oil production, stimulate collagen formation, reduce post acne scars and minimize skin inflammation. The herbal formulation was prepared and evaluated for the analysis of pH, moisture content, foaming index, foam retention time, alcohol insoluble matter, total fatty matter and the microbial testing by using microorganism *Escherichia coli* done with zone of inhibition method. The prepared poly herbal soap has good appearance, high cleansing, foaming effect and good skin glowing effect and does not have any side effect.

10) Vikas Kate 2023 :

Polyherbal soap is a type of soap that contains a combination of herbal extracts. The use of polyherbal soap has gained popularity due to its perceived effectiveness in treating various skin conditions. The formulation of polyherbal soap involves selecting and combining herbs based on their therapeutic properties and compatibility with soap-making ingredients. The evaluation of polyherbal soap involves testing its physical, chemical, and microbiological properties to ensure its quality and safety. Several studies have been conducted to evaluate the effectiveness of polyherbal soap in treating skin conditions such as acne, eczema, and psoriasis. These studies have shown promising results, suggesting that polyherbal soap may be a safe and effective alternative to conventional soaps. In conclusion, the formulation and evaluation of polyherbal soap involve selecting and combining herbs based on their therapeutic properties and testing the soap's physical, chemical, and microbiological properties. Further research is needed to establish the efficacy and safety of polyherbal soap for treating various skin conditions. **11) Rakesh K. Sindhu 2019 :**

The aim of our study was to develop the polyherbal hygienic soap by using cold process method and evaluate antimicrobial potential by agar well diffusion method. Soap was prepared using coconut oil, castor oil, Neem oil, Mentha oil, rose petals extract and NaOH (lye) and the different extracts were incorporated into the basic saponification reaction. The herbal formulation was prepared then evaluation for the analysis of pH, Moisture content, foaming index, foam retention time, saponification, TFM determination, ethanol soluble matter and antimicrobial activity using different concentration of soap solution comparing with standard. The results demonstrated that pH 6.5–7, moisture content 3.5%, foam index was 16.5, foam retention time 10.0 minutes, Saponification value was 161.287 mg/ml, 72% TFM, ethanol soluble matter was 63.80% for herbal soap. Also the evaluation tests showed that the herbal soap has satisfactory antimicrobial results as compared to standard antibiotic. Moreover, oils used are added to treat various skin infections and for daily usage.

5. EXPERIMENTAL METHOD:

5.1. COLLECTION OF HERBS :

The all required herbs were collected from different areas of the Solapur, like flax were collected from local masala market in Solapur and other ingredients such as tomato juice from fresh tomatoes found in college area and they were finely chopped and juice was done by using mixer .

5.2. FORMULATION:

Melt And Pour Method : • Very first , weighed the all required ingredients

and kept them aside .

- After that kept a beaker on hot crack pot containing water , that breaker contained oil bases such as wax , oil (nourishing purpose) .
- Wait until they get melted , after that we added our herbs , with continuous stirring and temperature must be kept at 35°C to 40 °C does not exceed.
- Once the all ingredients were mixed properly , at last added a essential oils for fragrance and soap lye for coloring purpose with stirring.
- Poured the formulation into the moulds (plastic, glass or steel) and kept for room temperature for 24hrs.
- Removed the soap from the moulds and kept for 12 to 14 hrs and then soap was ready after that it was ready to packing. ⁽⁶⁾



Fig 5.2.1. Ingredients



Fig 5.2.2. Method of Soap Making



Fig 5.2.3. Formulated Batches

5.3. EVALUATION OF SOAP :

- **Physical Evaluation Parameters**
- **pH Test**
- **Irritability Testing**
- **Foaming Ability Test**
- **Foam Retention Time**
- **Saponification Value**

Following were the tests that we were performed and there results with the image proof

1)Physical Evaluation Test :

In physical evaluation, the general properties of soap are notified such as size shape , odour , color and these observations can be seen by naked eyes .

Batch	Color	Odour	Shape
F1	Brown	Sweet	Jelly
F2	Brown	Pleasant nutty flavour	Cylindrical
F3	Brown	Sweet	Cylindrical

Table 2: Physical Evaluation of Soap

2)pH Test:

The pH of the soap can be checked by applying the pH paper on freshly formulated soap and compare color or by using digital pH meter (1gm of soap dissolved in 10ml of water). The pH of all batches were found between 5 to 6.5

3)Irritability Testing:

The skin irritability test was done by applying the soap on skin for the rest 10 min , and there was no irritation observed , hence there was no irritancy of the soap.

Batch	Observation
F1	Non irritant
F2	Non irritant
F3	Non irritant

Table 4: Irritability Testing

4)Foaming Ability

This test was done by adding 2gm of prepaid soap in 20ml of distilled water and transferred into 50ml measuring cylinder; volume was make upto 25ml with water , after that 25 strokes were given stand till aqueous volume measured upto 25ml and measured the foam height, above the aqueous was measured.⁽²⁾

Batch	Reading 1	Reading 2	Reading 3	Average
F1	0.7cm	1cm	1.1cm	0.9cm
F2	2cm	2.5cm	2.9cm	2.4cm
F3	2cm	2.1cm	2.4cm	2.6cm

Table 5: Foaming Ability Test

5) Foam Retention Time:

25ml of the 1% soap solution was taken into a 100ml graduated measuring cylinder. The cylinder was covered with hand and shaken for 10 times . The volume of foam at 1min interval for 4 minutes was recorded.⁽³⁾

Batch	1 minute	2 minute	3 minute	4 minute	Average
F1	0cm	0cm	0cm	0cm	0cm
F2	3sec	4sec	4.40sec	5.10sec.	4.1sec
F3	3sec	3sec	3.9sec	4.2sec	3.5sec



6) Saponification Value :

- Weighed 2gm of bees wax and added to conical flask considered as 'w'.
- Dissolved in 25ml of 0.5N alcoholic KOH .
- Reflux the above mixture for half and hour .
- When resulting solution was cooled titrated against 0.5N HCL with 1ml phenolphthalein indicator.
- Repeated the titration for blank solution.
- Calculated number of ml of acid required for both back and blank sample .
- Back as 'a' and blank as 'b'.⁽³⁾ • Formula :

$$\text{Saponification Value} = (b-a) \times M \times N / w$$

Where,

'b' is blank in ml

'a' is back in ml

'M' is a molecular weight of KOH

'N' is a normality of HCL

'w' is a weight of fat

- Saponification Value is 42.07 mg KOH/g



Fig: Solutions prepared.



Fig : Reflux method

RESULT & DISCUSSION :

Sr.no.	Tests	Report
1	Physical Evaluation	Pass
2	pH	Pass
3	Foam Retention Time	Pass
4	Foam ability	Pass
5	Irritability Testing	Pass
6	Saponification Value	Pass

As the above evaluation tests and their results, it is proved that the soap is safe and useful for the human skin and shows the expected results as we expecting.

CONCLUSION :

From this research study , we tried to invent new herbal cosmetic , and we made 3 batches with different concentrations of ingredients. After that we performed all the evaluation tests for the batches , from these teste we conclude that the soap is not harmful, and safe for the use . Flaxseeds are more nutritious and useful for the beautification and also as food nutrition it shows more beneficial results. Flaxseed has nutritional and

functional properties. In fact the content of compounds such as polyunsaturated fatty acids, essential amino acids, vitamin E, lignans and dietary fibers makes flaxseed a source to satisfy basic needs in the human diet and health maintenance. Healthy properties are related to anti-inflammatory, anti-oxidant, anti-carcinogenic activities and to the lowering of cholesterol, the decrease of cardiovascular disease and the prevention of diabetes.

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